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OsRMC, a negative regulator of salt stress response in rice, is regulated by two AP2/ERF transcription factors

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Abstract

High salinity causes remarkable losses in rice productivity worldwide mainly because it inhibits growth and reduces grain yield. To cope with environmental changes, plants evolved several adaptive mechanisms, which involve the regulation of many stress-responsive genes. Among these, we have chosen *OsRMC* to study its transcriptional regulation in rice seedlings subjected to high salinity. Its transcription was highly induced by salt treatment and showed a stress-dose-dependent pattern. *OsRMC* encodes a receptor-like kinase described as a negative regulator of salt stress responses in rice. To investigate how *OsRMC* is regulated in response to high salinity, a salt-induced rice cDNA expression library was constructed and subsequently screened using the yeast one-hybrid system and the *OsRMC* promoter as bait. Thereby, two transcription factors (TFs), OsEREBP1 and OsEREBP2, belonging to the AP2/ERF family were identified. Both TFs were shown to bind to the same GCC-like DNA motif in *OsRMC* promoter and to negatively regulate its gene expression. The identified TFs were characterized regarding their gene expression under different abiotic stress conditions. This study revealed that *OsEREBP1* transcript level is not significantly affected by salt, ABA or severe cold (5 °C) and is only slightly regulated by drought and moderate cold. On the other hand, the *OsEREBP2* transcript level increased after cold, ABA, drought and high salinity treatments, indicating that OsEREBP2 may play a central role mediating the response to different abiotic stresses. Gene expression analysis in rice varieties with contrasting salt tolerance further suggests that *OsEREBP2* is involved in salt stress response in rice.

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